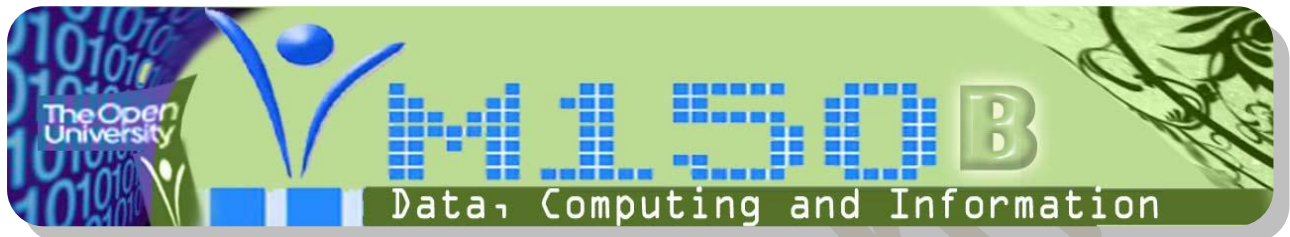




الجامعة العربية المفتوحة
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Assignment Booklet
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Answers Sheets

My M150B TMA01 in spring 2009/2010

My M150B TMA01 (Q1-2-3-4-5) with all thier parts.

This TMA covers units : 9-10-11 of block III

Document contents :

- ✓ ***Pages : 16***
- ✓ ***Tables : 1***
- ✓ ***Diagrams : 1***

Question 1 [25 marks]

A- Explain in your own words what you understand by the expression “Modules and modular programming. [5]

Modules and modular programming have been used in computing for many years .

A **module** is an identifiable and independent piece of software code that implements a particular task, also Modules are typically incorporated into the program through interfaces. A module interface expresses the elements that are provided and required by the module. The elements defined in the interface are detectable by other modules. The implementation contains the working code that corresponds to the elements declared in the interface.

Modular programming is a software design technique that increases the extent to which software is composed from separate parts, called modules. Conceptually, modules represent a separation of concerns, and improve maintainability by enforcing logical boundaries between components.

B- What extension do JavaScript programmers use for the function library?[1]

By convention an extension of **.js** (short for JavaScript) is used *as a suffix to the name of such an external file* .

C- Explain the rationale behind using separate code modules in JavaScript. You are to support your statement by giving a complete example but without writing the JavaScript code. [5]

A single programmer would ever be able to write such a program within an acceptable timescale let alone understand the logic of the entire program in all details. Old programming practice was based on writing programs as a single very big monolithic code file.

However, imagine the confusion if 5 or 6 programmers worked on the same code file! Which was the latest version of the file? Would a change implemented by one programmer have a detrimental effect on the code written by another programmer? there will be more problems such as very much time consuming, risk of loosing the

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string of logical thinking while writing, very error prone, difficult to debug, modify, read and update and Inability to distribute tasks among several programmers .

Confusion can be avoided by structuring a program into several code modules in several files helps overcome these problems, in this way different aspects of the programming task can be done developed separately(written, debugged and tested) by different people at the same time, then the code modules can be combined later to make up a complete program. If a problem arises when the modules are integrated into the program, locating and isolating problems is much easier than it would be within a monolithic program in a single file .

My statement : well designed and well specified modules can be considered as *replaceable components* which can be easily replaced by improved versions .

Just the hard drive of a computer might be replaced by a more powerful one, for instance : a module to gather input from the user by means of a form could be replaced by a module that gathers input from the user using dialogue boxes without affecting or making changes to other parts of the program .

D- JavaScript programmers may use some functions without any knowledge about the functions' implementation. What is the conventional naming of this type of programming; provide an example showing your understanding. [7]

The conventional naming of this kind of programming is **black box programming** which means the use of a function library (or indeed any code module) by reference solely to the documentation rather than their implementation, this term arises from the act that a programmer doesn't need to know anything about the coding details of a function which can be hidden from view in a black box.

In science terminology a **black box** is a device, system or object which can -and sometimes can only- be viewed solely in terms of its input, output and transfer characteristics without any knowledge of its internal workings, for example I have been using black boxes about the coding details of methods such as "parseFloat()" function which I can convert strings to float numbers. To convert string to integer I can use "parseInt" function. Using this function I can only convert string numbers to numeric data, but alphabetic characters I can't convert .

E- The term "comment" is used to describe the specification for a JavaScript function. What is the content of a function comment? Give an example illustrating your answer. [7]

The term "**comment**" is a text added to code by a programmer that explains how the code works, so that it used to embed programmer-readable annotations in the source code of a computer program. Comments are usually added with the purpose of making the source code easier to understand. The syntax and rules for comments. Comments are also used for integration with source code management systems and other kinds of external programming tools.

the content of the function comment should be about the result of using it and how to use it .

In JavaScript a comment line generally starts with `//`. Use the `/*` and `*/` delimiters to create a multiline comment, for example :

```
function drawLine(length,colour,indent)
/******
/* Function draws a line and takes three arguments: */
/* length -a whole number representing the length of the line. */
/* colour -a string that specifies the colour of the line. */
/* indent -a whole number which specifies the number of spaces */
/* the line is indented from the left-hand side of the page. */
/* Function returns no value. */
/******
```

Question 2 [25 marks]

A- Write down JavaScript code which creates a *Date* object to represent your birthday date. [2]

This is the code to represent my birthday date :

```
<HTML>
<HEAD>
<TITLE>my birthday date</TITLE>

<SCRIPT SRC=dateLibrary.js> </SCRIPT>
<SCRIPT>

var birthDay = new Date (1990,3,15);
document.write('I was born in = ' + birthDay);

</SCRIPT>
</HEAD>
<BODY>
</BODY>
</HTML>
```

B- Write down JavaScript code to find out *the day of the week of your birthday*. [3]

This is the code to find out the day of the week of my birthday :

Completion of the part B of the
question 2 in the next page

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```

<HTML>
<HEAD>
<TITLE>the day of the week of my birthday</TITLE>

<SCRIPT SRC=dateLibrary.js></SCRIPT>
<SCRIPT>

var birthDay = new Date(1990,3,15);
document.write('I was born at = '+
dayName(birthDay) );

</SCRIPT>
</HEAD>
<BODY>

```

C- Write down JavaScript code to find your age as a number of days. [3]

this is the code to find my age as a number of days :

```

<HTML>
<HEAD>
<TITLE>my age as a number of days</TITLE>

<SCRIPT SRC=dateLibrary.js></SCRIPT>
<SCRIPT>

var birthDay = new Date(1990,3,15);
var today = new Date();
document.write('My age as a number is = ' + differenceInDays(today, birthDay) +
' days.'+'<BR>');

</SCRIPT>
</HEAD>
<BODY>

```

D- What does the term scope of a variable mean? [2]

The term **scope of a variable** is the extent of access to a variable .

Scope refers to the visibility of variables. In other words, which parts of my program can see or use it. Normally, every variable has a global scope. Once defined, every part of your program can access a variable.

It is very useful to be able to limit a variable's scope to a single function. In other words, the variable will have a limited scope. This way, changes inside the function can't affect the main program in unexpected ways .

E- What is the difference between a *local variable* and a *global variable*? Give an example illustrating your answer. [3]

Local variable is one that is declared within a function, and can only be accessed in its function in a particular class or method . Such a variables are not visible to the outer software, a local variable exists for as long as the function executes, also Local variables are created during function calls for temporary use and are accessible only within the functions that create them .

Global variable is one that can be accessed -whether it is retrieving the value of, or assigning a value to it- anywhere in an application. A **global variable** can be accessed by all functions. It is initialized at the beginning of the program and is deleted when the program shuts down .Typically, global variables are used for variables that will need to be accessed throughout an application, like totals, file paths, etc. Global variables are seen by the entire class, project, solution.

Global variables should be avoided whenever possible unless they are absolutely necessary for the application, for example :

```
main()
{
    int a,b,c; (local variable
declaration)

}
Global variables are declared outside the
function main.

int FACT(int);
main()
{
    Local variable declaration;
}
```

F- You are given a global variable named *globalV*, and a function named *myFunction*. Suppose that this function contains a variable of the same name, *globalV*, and it has been declared within this function.

a. Do the variable *globalV* of the main program and the *globalV* of the function refer to the same variable? Explain your answer. [3]

Yes, because they have the same name and the program will **recognize** them as one variable .

b. If we change the value of *globalV* from within *myFunction*, what is the effect on the *globalV* of the main program? [2]

If the function had brought, the function will affect the variable in the main program, because the variables that are outside the function in the main program is not available and has no value if the function was called

If not called function will not affect the variable space and will be considered a variable correctly and effectively .

c. If we change the value of *globalV* in the main program, what is the effect on the *globalV* of the function *myFunction*? [2]

In the case if the function had brought, the function will not affect this change to the variable that is inside, but if the function hadn't brought This change will affect to affect this change to the variable inside the function.

Briefly, in case if a variable was declared inside any function was the announcement of this variable outside the function in the main program, the impact of the function brought effect is stronger than the global variable, or if it is the brought function will give us the global variable value declared .

G- Function variables and name collision is a very well known problem in programming. What does the term collision mean and explain what programmers do to avoid such a problem. Provide an example illustrating your answer.[5]

A **collision** is a situation that occurs when a global variable has the same name as a function, or another global variable, or when two functions have the same name, hash value, checksum, fingerprint, or cryptographic digest.

To avoid this problem programmers reduce the announcement of the global variables located in the main program or calling the names of functions, for example: `myLibrary_someVar`, instead of simply `someVar`, and `myLibrary_someFunction()` instead of `someFunction()` . To avoid long variable and function names it is common to shorten the prefix to the function library's initials, e.g. `ml_someVar` .

Question 3 [14 marks]

A- State the three object categories used by the JavaScript language and define each one of these categories. [4]

There are 3 objects categories in JavaScript :

native objects, host object, and user-defined objects .

- **Native object types** defined by the JavaScript language, native object is like the transparent persistence paradigm into the integration world: Transparent Native Programming with JavaScript. Native objects names start with a capital letter, and they are case sensitive. The instances of these are the `String`, `Array`, `Date` and `math` objects. To find the value of the mathematical constant `PI`, type `Math.PI`. If you try `math.PI`, you'll get an error message
- **Host object types** are supplied to JavaScript and provided by the browser for the purpose of interaction with the loaded document. Examples of these are

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window, document and form object types, the variables window and document are lower-case initial letter), which are particular examples of the window and document .

- **user-defined objects** are defined by me. I name the objects and implement them. My objects can start with either a lower-case letter or an upper-case letter, but they are case-sensitive .

B- What is the difference between *value semantic* and *reference semantic*? [3]

Reference semantic : In the case of objects, if you assign an object to a variable, the variable holds a reference to the object, rather than the object itself. The memory location is 'labeled' by a variable will hold a reference to the first block of memory where the object is stored, together with the number of blocks of adjacent memory that the object occupies.

This is because the sizes of objects are not predictable.

Objects can be any size (much larger than eight bytes) and so cannot be stored directly in the same way as primitive data types

Value semantics: In the case of primitive data types, the memory location holds the data value. This is because each primitive type has a fixed size and, as primitive data types are single data values, it tends to be small Therefore, JavaScript allocates 8 byte block of memory for the storage of any primitive value .

Briefly the difference in storage mechanism stems from the fact that the sizes of objects are not predictable. Each primitive type has a fixed size and, as primitive data types are single data values, it tends to be small. JavaScript allocates an 8 byte block of memory for the storage of any primitive value (although some of this may not be used, depending on the particular type involved).

c- Create an **employee** object with the **name** property set to "Samir", the **job** property set to "Tutor" and the hiring date property set to "2007". Assign the newly created object to a variable named **newEmployee**.

```
<HTML>
<HEAD>
<TITLE>Solution of Q3-d</TITLE>
<SCRIPT language="JavaScript">
<SCRIPT>

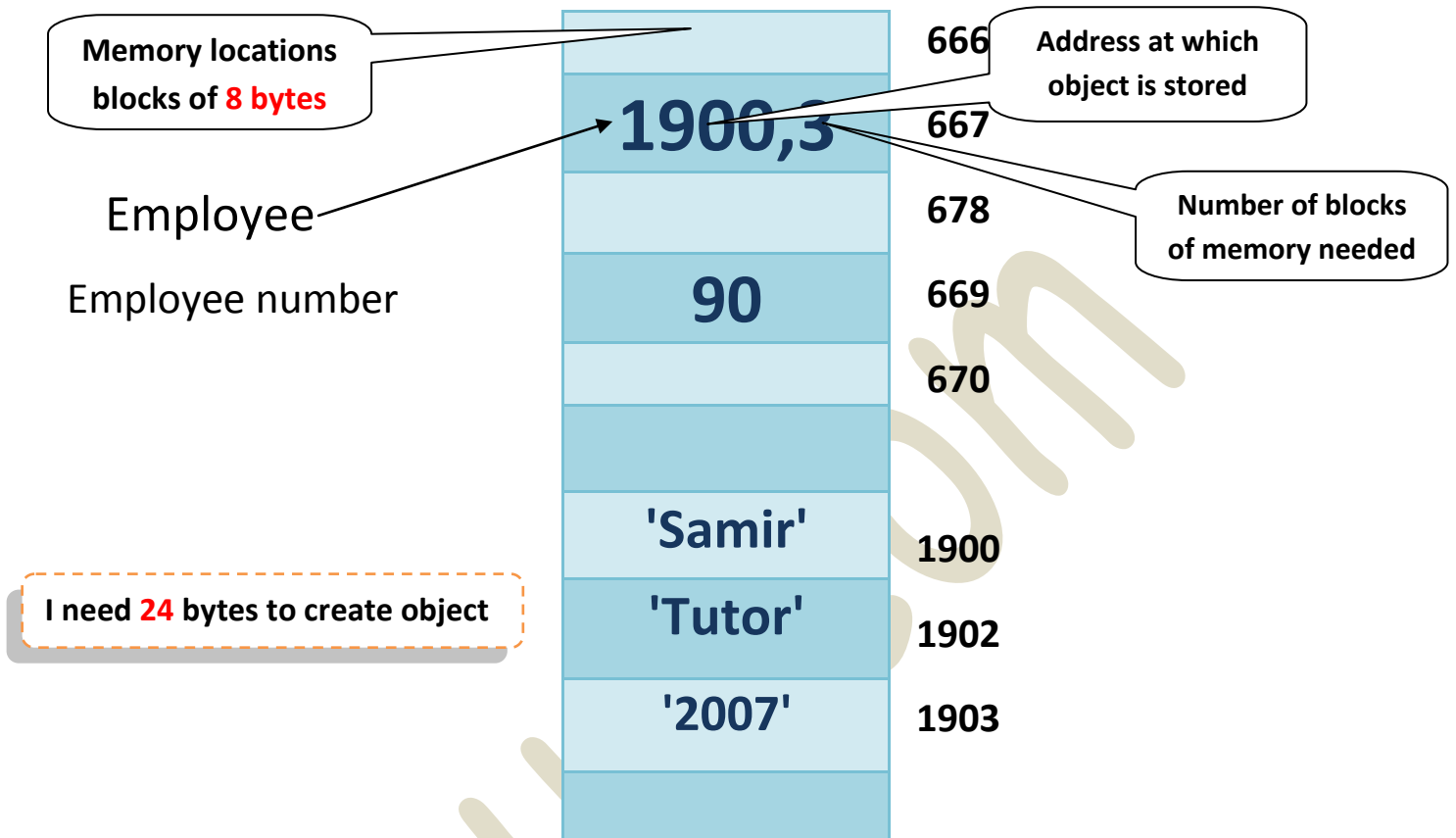
function employee(aName, aJob, aDate)
{
//object properties
  this.name = aName;
  this.job = aJob;
  this.date = aDate
};

var newEmployee;

newEmployee = newEmployee('Samir', 'Tutor', 2007);
document.write('the employee name is ' + newEmployee.name);
document.write('<BR>');
document.write('the employee job is ' + newEmployee.job);
document.write('<BR>');
document.write('the employee hiring date is ' + newEmployee.date)

</SCRIPT>
</HEAD>
<BODY>
```


Draw a one column table showing the storage of primitive data value and objects in memory. How many bytes do we need to store the object *employee* along with its variables? [7]



Question 4 [24 marks]

In the software development process, three stages are considered very important: requirement analysis, design and implementation.

A- What the work is to be conducted in each stage? [3]

In the software development process, 3 stages are considered very important:

Requirement analysis, Design and Implementation :

- **Requirements analysis** : understanding the required of the program and identify the characteristics and output to define a problem clearly and to specify the nature of the proposed solution .
- **Design** : Designing the program structure and codes draft and the work of graphics and charts .

- **Implementation** : creating detailed design and implementing the codes, and then link the parts of the program and work closely with each other .

B- How are these stages related to each other in time and content? [2]

Of these 3 stages speed up the construction process, and reduce the amendments, which could take a lot of effort and time, and follow the 3 steps correctly will raise the quality of the software, and fulfills the wishes of the user significantly. It also enables programmers to take advantages of Modules generated by the tasks and future projects to finish the software on time and avoid the mistakes, and save the program in a timely manner .

c- What do the developers do if a problem is encountered in the design stage concerning the incompatibility with the requirement analysis? [2]

They will have to refine the charts, modules, and pseudo codes that they are working on to make sure that they all confirm a 100% to the requirements, Otherwise, We follow a top-down approach when dealing with the problem, from its most general aspect to the smallest detail .

d- Draw a diagram to show the stages in the software development process. You are requested to write comments and explanations on your diagram. Create your own diagram; any diagram copied from another source will not be graded. [6]

The full answer of
part **D** "drawing a
diagram" is in the
next page '10'

Software development process

Requirements analysis

Requirements analysis is critical to the success of a development project. Requirements must be actionable, measurable, testable, related to identified business needs or

Design

Software design is a process of problem-solving and planning for a software solution. After the purpose and specifications of software are determined, There are many aspects to consider in the design of a piece of software : **structured**,

Implementation

Implementation is the realization of an application, or execution of a plan, idea, model, design, specification, standard, algorithm, or policy, an implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system. Many implementations

Testing

Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software Testing also provides an objective, independent view of the software to allow the business to appreciate and understand the risks at

Maintenance

Software maintenance is the modification of a software product after delivery to correct faults, to improve performance or other attributes, or to adapt the product to a modified environment .

E- What do programmers do to locate errors in their code? [3]

usually possible to locate common errors simply by reading through the code by using debugging and using a compiler to run the program and indicates the type of error to determine and removing the cause of an error in a program .

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F- List three types of programming errors and give an example illustrating your understanding of each one of them. [4]

There are 3 basic types of program errors. Obviously, your objective is to write programs that are totally free of program errors. Program errors are also referred to as program bugs .

The first type of error is a **syntax error**. You already know that syntax errors are caused when you don't obey the syntax rules of C#. A common syntax rule you might make in the beginning is forgetting to terminate each program statement with a semicolon.

Intellisense does an excellent job of catching syntax errors. While you may hate the squiggly line that Intellisense displays, it's a lot easier for Intellisense to detect and isolate syntax errors than it is for you to do it yourself .

Ex common syntax errors include forgetting to include both sets of quote mark on string. For example :

```
document.write('Hello World!'; we forget the bracket ")" that close the sentence.
```

2- Run Time Errors :

Run-time errors are errors that occur while your program runs. These typically occur when your program attempts an operation that is impossible to carry out.

An example of this is division by zero. Suppose you had the following statement: Speed = Miles / Hours, If the variable Hours has a value of 0, the division operation fails and causes a run-time error. The program must run in order for this error to be detected, and if Hours contains a valid value, it will not occur at all.

When a run-time error does occur, you can use the debugging tools in Visual Basic to determine the cause. You will learn how to find and fix run-time errors in the lesson Ouch! My Program Didn't Like That! Finding and Eliminating Run-Time Errors.

3- Logic Errors :

Logic errors are errors that prevent your program from doing what you intended it to do. Your code may compile and run without error, but the result of an operation may produce a result that you did not expect.

For example, you might have a variable named `FirstName` that is initially set to a blank string. Later in your program, you might concatenate `FirstName` with another variable named `LastName` to display a full name. If you forgot to assign a

value to `FirstName`, only the last name would be displayed, not the full name as you intended.

Logic errors are the hardest to find and fix, but Visual Basic has debugging tools that make this job easier, also.

G- What does “tracing a variable’s value” mean? Give an example. [2]

Tracing variable value is a useful technique that can be used by programmers to locate errors and bugs in their programs during the execution of a program, particularly errors involving initialization or updating of variables. For example :

Line	Num	sum	num <=4
1	0		
2	0	0	
3	0	0	true
4	1	0	
5	1	1	
3	1	1	true
4	2	1	
5	2	3	
3	2	3	true
4	3	3	
5	3	6	
3	3	6	true
4	4	6	
5	4	10	
3	4	10	true
4	5	10	
5	5	15	
3	5	15	false

H- Why do programmers insert temporary output statements in their programs? [2]

Because Inserting temporary output statements is a way to investigate what is wrong with a program, and once I have identified and corrected any problems, I can remove this code .

Question 5 [12 marks]

A- State the four dimensions of “reach” and explain in your own words your understanding of two of them. [2]

The 4 dimensions of “reach” are : space, time, perception and action .

Time is remarkable that the most real feeling in perception of time “the present”, cannot be measured in any units of time. Also time is part of the measuring system used to sequence events, to compare the durations of events and the intervals between them, and to quantify the motions of objects. Time has been a major subject of religion, philosophy, and science, but defining it in a non-controversial manner applicable to all fields of study has consistently eluded the greatest scholars.

Perception is the process of attaining awareness or understanding of sensory information. In order to understand and describe the process of perception we have to find all inputs and outputs of information .

B- Explain in your own words how humans and computers can act as agents. [2]

In the start, Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Because human-computer interaction studies a human and a machine in conjunction, it draws from supporting knowledge on both the machine and the human side. On the machine side .

I will review how humans and computers can act as agents :

Humans as agents: the characteristics of agency –purposeful action, autonomy and identity –are shared by a human in an agency role. In terms of human–computer interaction, which refers both to the construction and the use of computers and their associated software by humans, I need to understand the role of human agents as builders of computers and as users of computers in terms of these characteristics .

Computers as agents : Human beings invented the computers because we have a compelling interest in *data*, I seek to turn our perceptions into symbols and then to store, analyze, process and these symbols into something else : *information* .

Computers are tools that have been built in order to transform data into information.

If human–computer interaction involves interactions between agents, computers must -in some sense- be capable of agency. Computers are not a distinct type or kind of being . Computing or "Computation" is a complex practice involving the design, construction, maintenance, and use of intentional systems .

On this basis, we might say that a computer has a purpose determined by the human agent that designed, built, and programmed it, and becomes autonomous when we ask it to interact –with a disk drive, on the internet, or with another human.

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As for identity, a computer that interacts with other computers on the internet can be uniquely identified through its IP address.

Because a computer is designed, built, and programmed, a piece of software or a piece of hardware or a combination of the two can be seen as a computer being an agent .

C- Explain how actions can be delegated through programming. [2]

Delegation can be defined as the act of entrusting authority to another human or computer for performing a task or activity .

There are very many situations in which this occurs. For example I thought of using my computer's internal clock for telling the time I trust the computer because I have been using its clock .

Compared with other machines, including those containing special purpose computers, for instance : "**washing machine**", there is a computer embedded in it, so the machine is programmed to do a particular action, there are few limits in principle to the size or types of program that can be run by general purpose computers of the kind that are familiar to us, for instance laptop and desktop PCs .

In fact general purpose computers can't act without a set of instructions telling them what to do. To delegate to a computer means having to tell it, somehow, what to do.

D- What are the computer currencies? [2]

The basic types of computing currencies are : **Data** and **information** .

E- The information loop is made up of four distinct activities. List these activities and explain *in your own words* the role of each one. [4]

- **Transformation of information into information** : this activity is based on human-human interaction (HHI)
- **Contraction of information into data** : this activity works via the representation of information in a form that the computer can deal with. This involves decontextualization, i.e. a process of abstraction involving the elimination of information considered irrelevant to the task in hand. To contract information into data means to remove meaning from information, and is one of the costs of computing that must be met by a human agent.
- **Transformation of data into data** : this activity based on computer–computer interaction. (CCI) .
- **Expansion of data into information** : this activity works via interpretation by a human being. This involves contextualization, i.e. putting data in the

context of other data and information considered relevant to the task in hand. To expand data into information means to give meaning to data and again, is one of the costs of computing that must be met by a human agent .

finished